

Report for 2001GU2121B: Inventory and Evaluation of Karst Features Relating to Past and Present Groundwater Flow in Saipan, in Terms of the Carbonate Island Karst Model

There are no reported publications resulting from this project.

Report Follows:

PROJECT SYNOPSIS REPORT

Project Title: Inventory of Karst Features Relating to Past and Present Groundwater Flow on Tinian, CNMI, in Terms of the Carbonate Island Karst Model

Problem and Research Objectives

This project consisted of a survey of the karst features that control the input, transport, and discharge of fresh water from the limestone units covering the island of Tinian. Specific work included mapping and cataloging of karst surface features, caves, and coastal discharge features. In addition to obtaining such data to support sustainable development of Tinian's aquifer, the project provides new data by which to develop a more accurate and complete conceptual model of carbonate island karst aquifers in general. Karst research begun on the relatively uncomplicated aquifers of Atlantic-Caribbean islands has recently been completed on Guam and extended to Saipan. This project extended the work to Tinian. Tinian is unique in that it is a composite island (i.e., a carbonate island with the volcanic core of the island exposed near the center) with relatively compact shape and simple topography. This makes it ideal for testing certain hypotheses regarding the evolution of island karst aquifers.

Methodology

The study employed the classical methods of geological field investigation, including surface traverse and mapping, mapping of caves, and photo-documentation of key features both above and underground. Previous maps of the general geology (Doan et al., 1960) showed numerous faults and fractures. The relationship of structural features to sinkholes and coastal discharge features is now being systematically examined.

Principal Findings and Significance

The project began with an exhaustive literature and data search, which assembled all of the historical scientific and engineering publications related to the island. Many such documents are archived at the University of Guam's Micronesian Area Research Center. Much unpublished data also resides in the field offices of the USGS and Commonwealth Utility Corporation on Saipan and Tinian, and is accessible to support the project. All such data will be catalogued and put into a database to support the maps and diagrams that will be produced from the field study. These are being used to identify clues regarding the specific pathways by which water moves into and through the aquifer. Generalizations regarding such relationships will be incorporated in the Carbonate Island Karst Model, a general conceptual model for karst aquifers on small carbonate islands.

The project is the next logical step toward eventually completing a comprehensive survey of the island, as for Guam and Saipan. A technical report is currently being prepared from work done in Summer 2002. The results of additional field work in December 2002 and January 2003 will be incorporated in a final report that will be published in Summer 2003. The final report will contain the full set of maps and photographs from the survey, including sinkholes, caves, coastal springs, and other significant karst features. It will also document and explain the relationships between these and structural features mapped in the current study as well as by previous workers.